

to the Inconsequent or the Ridiculous. And one who tries to imitate him successfully must possess not only his nerve, but also his wonderful agility and resource of every kind. We shall therefore say no more on the subject of the Editor's additions to the volume, than that his daring has met with comparative immunity from the more obvious dangers of his course.

The original title of the work was, we are told, *The First Principles of the Mathematical Sciences Explained to the Non-Mathematical*. There can be no doubt that the new title is much to be preferred. We do not believe that the Mathematical Sciences, even in their first principles, can be explained to the Non-Mathematical. Whosoever understands the explanation has, to that extent at least, become Mathematical in the very act of understanding. But this observation is made on the assumption that Non-Mathematical means "uninstructed in mathematics." There is another sense which the term may bear:—viz. "incapable of understanding mathematics." Among mankind there are none who more persistently claim the almost exclusive possession of the highest grade of human intelligence than do the (so-called) Metaphysicians. How many of these self-accredited possessors of all but superhuman acuteness have been able to cross the *Pons Asinorum*? How many have been able to understand even the *objects* (not the *processes*) of mathematical investigation? When the answer comes (it probably will not come, as it *can not* come in a favourable form) it will be time to comment on it.

The chief good of this book, and in many respects it is very good, lies in the fact that the versatility of its gifted author has enabled him to present to his readers many trite things, simple as well as complex, from so novel a point of view that they acquire a perfectly fresh and unexpected interest in the eyes of those to whom they had become commonplace. Surely this was an object worthy of attainment! But it is altogether thrown away on the non-mathematical, to whom neither new nor old points of view are accessible.

Considering the circumstances under which the book has been produced, it would be unfair to comment on the smaller errors. But there are a few very awkward statements, and one or two grave errors, which ought not to have escaped correction. We give an example of each class. Thus, p. 16, the following statement is quite unnecessarily puzzling:—

"If we can fill a box with cubes whose height, length, and breadth are all equal to one another, the shape of the box will be itself a cube."

This out-germans German itself in the displacement of the words from their natural position in English; and, at first sight, seems to be nonsense. Read it, however, thus:—

"If we can fill with cubes a box whose height, &c. . . . the shape of the box itself will be a cube,"

and the absurdity, suggested by the collocation, disappears.

Again, p. 66, what are we to make of the following, standing, as it does, without comment or explanation of any kind?—

"The statement that a thing can be moved about without altering its shape may be shown to amount only to this, that two angles which fit in one place will fit also in

another, no matter how they have been brought from the one place to the other."

Several most serious qualifications must be imposed upon this statement before it can possibly be accepted as true.

The chapter on *Motion* properly forms a part of this work, so far at least as kinematics is concerned. But it seems to be a mistake to conclude it with a few editorial sentences on the *Laws of Motion*. For here we have a perfectly new subject, and one which would require at least a full chapter to itself. It is probable enough that, at some period of his life, Clifford imagined that it might be possible to get rid of the idea of matter as well as of that of force, and so to reduce Dynamics to mere Kinematics. He never so expressed himself to me. But purely physical subjects were, properly speaking, beyond his sphere; his ideas about them were always more or less vague, because always of a somewhat transitional character, and were much modified at times by the momentary turn of his philosophical speculations. We are told in a foot-note to the first page of the *Preface* that Clifford left his *Kinetic* (a companion volume to his *Kinematic*) in a completed state. Surely, keeping this in view, the introduction of Laws of Motion into the present work was superfluous.

This foot-note unfortunately strikes a jarring chord at the very first opening of the book. We are told that "more serious delay seems likely to attend the publication" of Clifford's completed MS.; this is followed by a mysterious species of protest or remonstrance. Clifford could never have written in this vein. He would either have kept silence, or have blurted out the whole truth. Mystery and insinuation were not weapons of his, and should not be employed in connection with his name.<sup>1</sup>

P. G. TAIT

#### OUR BOOK SHELF

*New Commercial Plants and Drugs.* No. 8. By Thos. Christy, F.L.S., &c. (London : Christy and Co., 155, Fenchurch Street, 1885.)

THE eighth number of Mr. Thos. Christy's "New Commercial Plants and Drugs" has recently appeared, and the contents are of a similar character to those that have preceded it, the most recently introduced commercial products derived from the vegetable kingdom being enumerated and what has been written about them brought together. The first plant referred to in the book is of course the Kola nut (*Cola acuminata*), as being one of the most important, or at least one that has attracted a very large share of attention during the past year. This article is illustrated by a coloured plate of the fruit and seeds of this species, as well as of the Guttiferous plant known as the Bitter Kola. Besides having the property of cleansing or purifying and thus rendering wholesome stagnant or foul water, it has also been used for clarifying beer and spirits. One of its most remarkable properties is in restoring the senses after partaking to excess of intoxicating drinks. The most recent application of the Kola nut, however, is in the preparation of a paste for mixing with cocoa or chocolate, which it is said to improve "both in strength and flavour to an astonishing degree." It is considerably more nutritious and strengthening; so much so indeed "that a workman can, on a single cup taken at breakfast time, go on with his work through the day without feeling fatigued."

In consequence of this and many other medicinal

<sup>1</sup> In NATURE, vol. xxxii, p. 4, Mr. Tucker intimated that Messrs. Macmillan and Co. would publish the remaining mathematical papers of the late Prof. Clifford.—ED.

virtues the Kola nut is considered to have a great future before it in European commerce, and is consequently strongly recommended to the notice of planters in our colonies for extensive cultivation. With regard to the preservation of the germinating properties of the seeds, Mr. Christy says he has received them in good condition, both in baskets and barrels lined with the leathery leaves of a tree known as the "bal tree." Some received in dry loam arrived as fresh as when they were gathered, and of some that arrived eighteen months since, the bulk is stated to be perfectly fresh and retaining still their beautiful red colour.

From a list of fifteen species of *Myristica*, the fruits or seeds of which are described, the value of the nutmeg genus is shown, especially as oil seeds. Seeds new to commerce are frequently arriving in the Liverpool and London markets, intended for the expression of oil and for the preparation of oil cake. Such seeds are of a very varied character and belong to widely different natural orders, and not long since those of *Myristica surinamensis* came into Liverpool under the name of African nuts. Upon analysis they were found to contain a large quantity of solid oil or fat with an agreeable taste, and but little, if any, odour, and when fairly pure it is said to resemble cocoa butter.

Amongst other important economic plants or drugs mentioned are the Coca (*Erythroxylon coca*), the medical effects of which have attracted so much attention of late; the Jamaica Chewstick (*Gouania domingensis*), which, it is stated, "has recently been introduced into this country by one of our leading London dentists for use in tooth powder and mouth wash," and also in the form of a fluid extract as a gargle for relaxed throat.

Of Papaine, the active principle of the Papaw (*Carica papaya*), some interesting records are given regarding its effects in treatment of diphtheria, croup, indigestion, dyspepsia, &c.

#### LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

#### Ocular After-Images and Lightning

IN reply to Mr. Sheldford Bidwell's query whether the quiver of the lightning flash is a purely subjective phenomenon or not, I send the following extract from my note-book, made October, 1873:—"A flash of lightning consists of several separate flashes all occurring within a fraction of a second of each other. There was a very severe thunder storm at night, the thunder almost continuous. Drawing the curtain across the window so as to expose only a narrow slit of skylight, I observed this slit in the looking-glass which I kept moving rapidly backwards and forwards on its axis. Whenever a flash occurred, several images of the slit appeared, showing that there were several successive illuminations of the slit."

This was not the result I had expected, the experiment having been suggested to my mind in consequence of some experiments I had been making on the phenomenon of recurrent vision. The results of these experiments were published in the *Phil. Mag.*, December (supplement), 1872. One object of my experiments was to determine in what way the colour of the recurrent image depends upon the colour of the light producing it. By using a sliding shutter and a small window covered with different coloured glasses, I found that the colour of the recurrent image tends to be of a tint complementary to that of the light causing it, being, however, in all cases bluer than the complementary tint. I add the following extract from my paper:—"A recurrent image of an object may be produced without any apparatus whatever. To do this, place the right hand over the eyes

so that the palm of the hand covers the right eye, and the fingers the left eye. If the middle finger be then raised for a moment, so as to admit light for as short a time as possible into the eye, a recurrent image of any light-coloured object held against a dark background may be seen. The effect is much better seen by twilight or gaslight than in full daylight. This method of producing a recurrent image is, however, much inferior to that in which a sliding shutter is used, owing probably to the illumination of the retina not being sufficiently instantaneous.

Cheltenham College, June 6

A. S. DAVIS

#### A Quinquefoliate Strawberry

IN your issue for April 30 (vol. xxxi. p. 601) is an account of a quinquefoliate strawberry. In the garden of the New York Agricultural Experiment Station at Geneva we have some second year seedling strawberries, some of which are bearing three, four, and five leaflets on the same plant, the leaves all large and perfect. We have other plants in which the two extra leaves are borne half way down the petiole, and which attain fair size, and yet others where these stipular-like appendages are reduced to hair-like bracts. The variety of strawberry introduced under the name "Mrs. Garfield" frequently has these bract-like appendages. While speaking of the strawberry, I would remark that seedling strawberries very frequently are unifoliate during their early growth, and it appears as if Duchesne's *Fragaria monophylla* may be regarded as an instance of arrested development in one of these one-leaved younglings.

E. LEWIS STURTEVANT

New York Agricultural Experiment Station,  
Geneva, N.Y., May 28

#### OBSERVATIONS OF THE TEMPERATURE OF THE SEA AND AIR, MADE DURING A VOYAGE FROM ENGLAND TO THE RIVER PLATE IN THE S.S. "LEIBNITZ"

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EING obliged to proceed to South America at the beginning of this year, I took with me a thermometer and a hydrometer in order, if circumstances were favourable, to provide myself with occupation during the somewhat long and monotonous voyage. Thanks to the kindness and courtesy of Capt. Brown, of the s.s. *Leibnitz*, who took a lively interest, and assisted me greatly in carrying out my observations, the voyage was neither long nor tedious.

The *Leibnitz* sailed from Southampton on January 16, 1885, and made the passage direct, without touching at intermediate ports, to Monte Video, where she arrived on February 8, after a very favourable voyage. The route lay through the most interesting meteorological districts of the Atlantic, and my principal object at starting was to make as many observations of the temperature and the density of the surface-water along the route as possible. With these I combined observations of the temperature of the air, and frequently also of the wet-bulb thermometer. Observations were begun on January 21 in lat. 34° N., and continued up to the morning of arrival in the River Plate.

I have put together the simultaneous observations of the temperature of the air and the water with those of the wet-bulb thermometer, as they possess some interest of their own; the observations of density are kept for a future opportunity, as the reductions in connection with them are not quite finished.

The thermometer used for all the observations was divided into simple degrees of the Centigrade scale, and was of the ordinary form of German manufacture, with a paper scale. The degrees were 1.6 mm. apart, so that there was no difficulty in estimating tenths of a degree. Its zero was verified on board by immersing it in pounded ice, and found correct. The ice was well pounded in a clean towel, and a soda-water tumbler filled with it; the thermometer was then thrust into it and allowed to remain till sufficient ice had melted to fill up the interstices, producing a perfect magma of ice and water down to the